

(DTIC)



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July 20, 1998

Dr. Michael R. Berman, Program Manager
Directorate of Chemistry and Materials Science
Department of the Air Force
Air Force Office of Scientific Research (AFOSR)
Bolling Air Force Base
Washington, DC 20332-6448

Dear Michael:

Enclosed is my final technical report for my AFOSR DURIP'97 grant #F49620-97-1-0186.

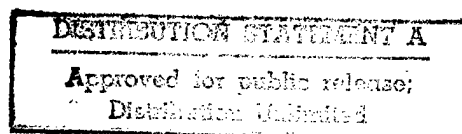
Best regards,

A handwritten signature in black ink, appearing to be "R. Saykally", written over a circular scribble.

Richard J. Saykally
Professor of Chemistry

RJS:ewp

Enclosures



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A

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Jay R. Newman

DR. JAY R. NEWMAN
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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
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1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE 20 July 98	3. REPORT TYPE AND DATES COVERED Final Technical Report (4/1/97-3/31/98)		
4. TITLE AND SUBTITLE DURIP97 Infrared Cavity Ringdown Laser Absorption Spectroscopy: Metal-Containing Clusters and HEDM Molecules		5. FUNDING NUMBERS #F49620-97-1-0186		
6. AUTHOR(S) Richard J. Saykally				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) University of California Department of Chemistry Berkeley, CA 94720-1460		8. PERFORMING ORGANIZATION REPORT NUMBER		
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12a. DISTRIBUTION / AVAILABILITY STATEMENT				
		12b. DISTRIBUTION CODE		
13. ABSTRACT (Maximum 200 words) A high resolution infrared cavity ringdown laser absorption spectrometer has been developed to study proposed HEDM molecules and metal containing clusters. Using a novel tunable pulsed Alexandrite ring laser, we are able to generate tunable visible radiation with ca. 40 MHz bandwidth. This tunable visible light is downconverted to the infrared using stimulated Raman scattering in H ₂ and D ₂ . With this system, tunable radiation from the UV to the far infrared can be generated with ca. 100 MHz bandwidth. We will test this system using our pulsed supersonic laser vaporization source to study both metal and carbon containing species. Infrared Cavity Ringdown Spectroscopy has also been used to study water clusters in both pulsed supersonic beams and pulsed discharged nozzles.				
14. SUBJECT TERMS HEDM species, carbon cluster species, high resolution infrared cavity ringdown spectroscopy, pulsed discharge			15. NUMBER OF PAGES	
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17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UNLIMITED	

FINAL TECHNICAL REPORT

AFOSR DURIP'97

GRANT NO. F49620-97-1-0186

**"DURIP97 Infrared Cavity Ringdown Laser Absorption Spectroscopy: Metal-Containing
Clusters and HEDM Molecules"**

(Period Covered: 04/01/97 – 03/31/98)

Richard J. Saykally - Principal Investigator

Department of Chemistry

University of California, Berkeley

Berkeley, CA 94720-1460

In the original DURIP grant we requested a Continuum Mirage OPA System with a Coherent Infinity Pump Laser System, as well as a Laser Vision DFG package. With this system we would be able to perform cavity ringdown laser absorption spectroscopy experiments from the UV to about 16.0 μm with ca. 150 MHz spectral resolution.

Since the proposal was funded we have designed a new approach around a different high resolution pulsed laser – the Light Age Alexandrite System. This laser produces pulses with ca. 40 MHz linewidths and pulse energies near 150 mJ – considerably higher spectral resolution than obtainable from the OPA System, with much greater convenience. This system operates in the range 700-800 μm , necessitating a Raman shifting scheme to obtain IR wavelengths. We have designed an appropriate system that will in principle allow coverage from FIR to UV with very narrow bandwidths. The rest of the equipment charges are minor. The system is currently being tested.

**AFOSR DURIP'97
ACQUIRED EQUIPMENT**

**GRANT NO. F49620-97-1-0186
TOTAL GRANT AMOUNT \$245,000
(04/01/97 - 03/31/98)**

<u>NAME</u>	<u>MANUFACTURER</u>	<u>COSTS</u>
Coating for Reflective IR Mirrors	Laser Power Optics	\$ 18,950.89
Power Mac 6500 Computer System and Apple Color Stylewriter 2500	The Scholar Workstation	3,224.77
Coating for Reflective IR Mirrors	Laser Power Optics	10,825.00
Pulsed Alexandrite Laser/Pulsed Ring Oscillator System	Light Age Inc.	199,180.00
HI Hurricane I Computer System	Human Ingenuity Industries	1,403.05
Tektronix Field Upgrade Kit	Allied Electronics	568.31
HI Hurricane I Computer System	Human Ingenuity Industries	1,171.27
Power Mac 6500 Computer System	The Scholar Workstation	1,790.46
Stabilizer Vibration Isolators (4 sets)	Newport Corporation	3,823.24
Coating for Reflective IR Mirrors	Laser Power Optics	4,199.97
Total Equipment Costs		<hr/> \$245,136.96